

## THE RESULTS OF THE SURGICAL TREATMENT OF EXOPHTHALMIC GOITRE,<sup>1</sup>

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IN a paper read before the American Surgical Association in 1903 (ANNALS OF SURGERY, 1903, xxxviii., p. 161) the writer reported the results of eighteen cases of exophthalmic goitre operated upon by him, and his present desire is to give later reports on some of these cases and to add three recent cases. It is perhaps worth mentioning that there has been an apparent increase in the opposition to surgical treatment although the results of non-operative measures have not improved very much in spite of the use of various serums and of the Röntgen ray. Both the latter methods, as well as Abbé's method of burying a tube containing radium in the gland, are on trial as yet, for it is too early to know how complete and how permanent the results may be. The arguments of some of the medical authorities seem hardly fair. Eulenburg (*Deutsche Klinik*, 1904, vi. 744), for instance, making the extraordinary statement that patients do not die of exophthalmic goitre, a statement which hardly needs contradiction. We readily acknowledge that the majority of cases yield to medical and hygienic measures if the circumstances of the patient admit of proper treatment being fully carried out. But these conditions often cannot be fulfilled and many cases also are severe and resist treatment obstinately even from the beginning.

In the writer's opinion surgery should be reserved for severe cases which have resisted medical treatment, but this does not mean that it should be undertaken as Eulenburg wishes as a last resort and forlorn hope, for there can be no doubt

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that the mortality is greater in the bad cases than when the symptoms are slighter and the patient is in better condition. On the other hand we cannot advocate immediate and early operation in every case, because many recover with medical measures alone, and because there is a mortality to operations even in the comparatively light cases, although the risk is less than in the serious ones.

The only operations which need be considered are partial thyroidectomy, and extirpation of the cervical sympathetic nerve and ganglia. Ligature of the thyroid vessels has a palliative effect and is especially useful as a preliminary to thyroidectomy.

Sympathectomy was first advocated by Jonnesco (Balacescu, *Arch. f. klin. Chir.* 1902, lvii. p. 59). Hoping to avoid the acute thyroid poisoning which had made the mortality of his thyroidectomies so high, the writer tried sympathectomy in seven cases, but met with the same ill-fortune, two deaths occurring from acute thyroidism and one from the anæsthetic. Full details of these cases are given in the paper already alluded to. Of the four patients who recovered, the following report is made up to the present time. The numbers are those of the previous paper.

CASE XII.—M. F., female, 25 years old. Operation, May 17, 1899; middle and inferior ganglia of the cervical sympathetic removed on both sides. May 5, 1904, five years after operation, she was examined just after recovery from an attack of grippe. Pulse 70 to 90 while in bed, and even when the temperature had been 104, the pulse only reached 100 to 108. Thyroid gland normal in size and consistency. The eyes were normal, pupils dilated. The heart was normal, without murmurs. She had no tremor, was not nervous, slept well and had been able to work.

CASE XIV.—M. B., female, 28 years old. Operation, December 2, 1902; all sympathetic ganglia removed from both sides of neck. Primary union followed by immediate improvement of all symptoms. October 11, 1903.—Thyroid gland enlarged again, median lobe as large as a hen's egg. Pulse 138. Coarse tremor of fingers. January, 1904.—Improved since last note until the present, but is suffering from an attack of grippe and is much

worse. March, 1904.—Very ill. When put to bed, pulse dropped to 60 and so remained, but with poor force. Ran a high fever, without leucocytosis, and died March 20. Autopsy revealed an acute endocarditis without other lesions of importance.

CASE XV.—E. F., female, 23 years old. Has had exophthalmic goitre for two years, and had thyroidectomy of right half performed about one year before, with temporary improvement, then relapsed. Extreme exophthalmos, pulse 110 to 150, very nervous, tremor, dyspnoea. Operation, December 2, 1902; all cervical ganglia of the left sympathetic removed; December 19.—Same operation on right side. Immediate improvement. September 11, 1905.—Is doing full work as chambermaid. Rides a bicycle. Sleeps and eats well. Neck smaller, measuring 11½ inches. Pulse 120 while standing after walking. Eyes improved, left being no more noticeable than an ordinary myopic eye, right rather more prominent. No tremor or twitching; manner quiet; face does not flush.

CASE XVII.—L. W., female, 26 years old. Operation, January 17, 1903; all cervical sympathetic ganglia of both sides removed. May 11, 1903.—Neck measures 15¾ inches. Exophthalmos is less, can shut right eye completely, left eye almost, convergence normal, eyelids follow eyes downwards. Pulse 100. Feels well. February 13, 1904.—Her physician reported that patient has developed nephritis and a cardiac lesion, and has had oedema of the limbs for three to five weeks. The goitre has shrunk during this illness. Early death was expected.

Of these four cases, then, one relapsed within nine months, and a little over a year after the operation, she died of the original disease with an acute endocarditis. One case was completely cured five years after operation. One case was almost cured and still improving when she acquired nephritis about one year after the operation, and has probably since died. The remaining patient is able to do her work and enjoy life without medication, although goitre, exophthalmos, and slight tachycardia persist—a practical cure. We may safely conclude that the ultimate results of sympathetomy are fairly satisfactory. But the operation is much more difficult than thyroidectomy, not so easily done with local anæsthesia,

and the mortality is fully as high. Moreover, the scars come so high up that they are more disfiguring, by no means an unimportant factor, as the patient's employment often depends upon her appearance. For these reasons the writer has again turned his attention to thyroidectomy.

Three new cases have to be reported here.

CASE XIX.—Fanny C., single; United States; 28 years old; teacher. Was first seen by me in May, 1903, and her condition was so serious that I insisted on several months of rest and medical treatment before operating. October 19, 1903, she was admitted to St. Luke's Hospital in much better condition. Menstruation had been irregular and scanty. Nine years previously she had first noticed a swelling in the median line of the neck, which had gradually increased and for the last three years had interfered somewhat with swallowing. No nervous symptoms or dyspnoea at present. Slight exophthalmos. Eyelid follows eye in looking down. Thyroid gland considerably enlarged, with expansile pulsation, and with a murmur to be heard all over it. The largest circumference of the neck is  $14\frac{1}{2}$  inches. The strong pulsation of the heart is visible all over the præcordium. There is no hypertrophy. A loud systolic murmur is heard, especially at the apex. Lungs, examination negative. There is a fine tremor of the fingers. Pulse 84 to 120. Operation, October 20, 1903. Cocaine local anaesthesia. Ligation of right inferior thyroid artery. Cervical sympathetic nerve divided near second ganglion. Wound sutured and drained. Pulse 100. October 21.—Pulse 124, and temperature  $104^{\circ}$  at the highest. The right pupil is contracted, there is slight ptosis of the right lid, and that side of the face is flushed. The pulse reached 100, and the temperature was normal, on the fourth day. Primary union was obtained, the drain sinus being closed by the 26th. October 28.—Operation. Right superior thyroid artery ligated under local anaesthesia. There was but little febrile reaction and primary union was obtained. November 6, the goitre was smaller, the pulse lower, and the nervousness gone. December 6, 1903.—Pulse 84 to 120. Greatest circumference of neck  $13\frac{5}{8}$  inches. December 7.—Operation. Left inferior thyroid artery ligated under local anaesthesia. The pulse was 132 and the temperature  $102^{\circ}$  at the highest, and became normal in

three days. December 14.—Operation. Left superior thyroid artery ligated under local anæsthesia. After slight reaction the pulse and temperature became normal in three days. Primary union was obtained in both wounds, although a hematoma formed in the second. She continued to improve, but I advised thyroidectomy to guard against a relapse.

March 21, 1904, she was readmitted to St. Luke's Hospital. The pulse was 80 to 100, rising to 120 on exertion. April 1, 1904.—Operation. The right half of the thyroid gland was removed, by an oblique incision following the other scars. The skin was incised with local anæsthesia, and the operation begun. But there was very troublesome venous oozing, requiring the actual cautery to check it, and the parts were so sensitive as to make deep dissection very painful, and chloroform was administered. This was well borne, the pulse being only 116 at the end. The wound was sutured and drained. Eight hours later the temperature rose to 102° and the pulse to 140. The following day the pulse was 150 and the temperature 101<sup>3</sup>/<sub>8</sub> at the highest. The urine, always previously normal, contained one per cent. of albumin. There was restlessness and nausea. Primary union was obtained. April 28.—The pulse is 100 while standing after walking. Greatest circumference of neck is 12 inches. No tremor. Sleeps and eats well. September 20, 1905 (about eighteen months later), she reports that she is feeling perfectly well and is going on with her work. Pulse 70. Menstruation regular during last year. Has married and lost her husband in the past year.

CASE XX.—Annie C., 28 years old; single; born in United States. When first seen was in poor condition and was treated by her physician for three weeks with rest, icebag to the heart, aconite diet, etc., with considerable improvement. April 19, 1905, admitted to the General Memorial Hospital. She had always been nervous. Menstruation regular, formerly profuse, latterly less so. For last year has been very nervous and has had severe frontal headache. Neck has increased in size. She has had pronounced tremor and twitching of the extremities and palpitation of the heart. Pulse now 105 to 112. (When first seen was 130). No albumin in urine. The exophthalmos is slight, the enlargement of the thyroid moderate. The patient is extremely nervous, and the tremor very well marked.

Operation, April 20, 1905.—Cocaine anæsthesia was tried, but patient was hyperæsthetic and absolutely uncontrollable, trembling and twitching, yet eager to have the operation carried out. Chloroform had to be administered after the skin had been incised, and the operation was rapidly completed, the right half of the thyroid gland being removed. The wound was sutured and drained. The patient was somewhat cyanotic and the pulse was 145, respiration 44, and temperature  $101^{\circ}$  when she was put to bed. About eight hours after the temperature had reached  $102\frac{3}{5}^{\circ}$ . At noon next day the pulse was said to have been 230, respiration 58, and patient was thought to be dying, but rallied and was able to talk and acted rationally all the afternoon. The temperature, however, rose to  $104^{\circ}$ , the pulse running 144 to 165; the respiration became more labored, and she died about forty hours after the operation. Albumin and hyaline casts were found in the urine after operation.

CASE XXI.—Maud W., 24 years old; single; born in United States. Admitted to General Memorial Hospital April 11, 1905. Menstruation regular. Had nervous prostration for three months, two years ago. Four years ago throat began to enlarge and has steadily increased in size. Now the greatest circumference is  $14\frac{1}{2}$  inches. Four months later became nervous and exophthalmos began, increasing ever since. In last two years has grown less nervous. Since her neck swelled, has had moderate dyspnœa on exertion, and mild palpitation of the heart. Sleeps well. Has several times had attacks of great nervousness and restlessness with high fever. Pulse 110 to 130. Heart apex beat normal, with marked pulsation of præcordium. Reduplication of valve sounds and confused indefinite murmurs. Systolic murmurs in both carotids. No thrill. There is extreme exophthalmos, so that the lids do not close by a space of one quarter of an inch, and do not follow the eyes in looking down. There is moderate nervousness, patient having good self-control. Slight tremor of fingers. Moderate enlargement of the thyroid gland. Two weeks were spent in preliminary treatment in bed with icebag to heart, bromides, aconite, and limited diet (no red meat). Operation, April 25, 1905. Under cocaine anæsthesia, the right superior thyroid artery was ligated. Wound sutured without drainage. The temperature rose to  $102\frac{3}{5}$ , pulse 134, next day, and was three

days in falling to normal, but primary union followed, with immediate though slight improvement in the patient's subjective symptoms, especially the loss of strained feeling in the eyes. May 1 she could close the eyelids completely. Pulse 90 to 100. May 5, 1905, operation. Under cocaine anaesthesia the right half of the thyroid gland was removed. The parts were very sensitive, requiring much cocaine, but the patient was very courageous and patient. The wound was sutured and drained. There was a marked febrile reaction, temperature  $102^{\circ}$  and pulse 134, with gradual fall to normal. Primary union was obtained except in the drain-sinus, which discharged a sticky serum abundantly and was still open when patient was discharged two weeks later. All symptoms were immediately improved. September 8, 1905, she writes that she considers herself well. Pulse 72-84. No dyspnoea. Eyes less prominent. Sleeps well. Still has slight tremor of fingers.

The previous paper contained a study of the condition of acute thyroidism, which has been the cause of death in almost all my fatal cases. Acute thyroidism is marked by a rise of temperature with exacerbation of all the ordinary symptoms of the disease. In all six fatal cases there was albuminuria also, but in only two of these was it present before operation. If found, albuminuria would furnish a strong reason for declining operation. One case of thyroidism which recovered had albuminuria. The cause of this condition is not yet definitely known. The most popular theory ascribes it to absorption of the thyroid material from the wound, but this explanation is altogether too crude to be acceptable. In the first place, attacks of acute thyroidism are seen in the usual course of the disease when the patient is leading an ordinary life, or under general treatment only, without any local measures.

Secondly, any nervous excitement, a fright, anxiety, even ordinary business worry will often bring on an attack. If there is a history of such attacks as in Case XXI, especial precautions are necessary in undertaking surgical treatment. In one of my cases the symptoms set in a couple of hours before the time appointed for operation and the latter was

postponed. It cannot be claimed that in this case the crisis was due to rough handling of the gland during the usual antiseptic preparation of the neck, for the latter had taken place over twelve hours before. Fatal thyroidism followed the operation in this case.

Thirdly, the symptoms are seen just as frequently after sympathetomy as after thyroidectomy, and also after operations done on distant parts of the body in patients with exophthalmic goitre; for instance, ovariectomy (two cases), appendectomy, amputation of the breast, tonsillotomy, uterine curettage, tooth extraction. (See Sanderson, *Amer. Medicine*, 1905, ix. p. 197, and Mayo, *Medical Record*, November 5, 1904.

The so-called aseptic fever following operations without infection, or with so little infection that primary healing of the wound is not prevented, a fever which in the ordinary individual produces very slight disturbance, might very well be much more serious in persons with exophthalmic goitre, and this suggests a partial explanation. In a study of aseptic fever some years since (*Medical News*, June 24, 1899) the writer suggested the possibility of operative shock causing a rise of temperature like aseptic fever under some circumstances, and he believes that there is an element of shock in acute thyroidism. The causes of acute thyroidism are probably complex and include the nervous strain of undergoing an operation, the disturbing effects of general anaesthesia on various functions of the body, the shock of the operation itself, and the absorption from the wound of toxic materials—quite as much as the chemical bodies produced by minimal septic infection as the products of the thyroid gland.

In the former paper the conclusion was reached that general anaesthesia was to be avoided, and shock reduced by every means possible in order to escape acute thyroidism. In the three recent cases this was attempted by employing cocaine anaesthesia, and by dividing the operation into several sittings. In two cases this produced excellent results; in the third general anaesthesia had to be employed, and although chloroform was used, acute thyroidism promptly followed, and death ensued. If chloroform had been administered to the last patient, and



a thyroidectomy done without preliminary ligation, it seems certain that death would have resulted, for even the comparatively slight operation of ligation of the superior thyroid artery under cocaine anæsthesia was followed by severe febrile reaction.

Experience thus favors the earlier conclusions. In addition to the advice to divide the operation by performing preliminary ligation of the arteries, and to use local anæsthesia, I would now add that it is advantageous if not absolutely necessary to have the preliminary treatment by rest in bed, icebag to heart, bromides, etc., carried out at the hospital where the operation is to be done, in order that the patient may learn to know and trust the surgeon, and to like the nurses, growing familiar with her surroundings. This adds greatly to the efficiency of the control of the patient under local anæsthesia.

Reviewing the results of thyroidectomy, we have in all fourteen cases with four deaths, all from acute thyroidism. In addition to the two recovered cases just reported, final reports on the cases in the former paper are as follows:

CASE I.—L. E., 24 years; female. Operation November 11, 1893; right half of thyroid removed. September 1905, twelve years after, continues well. Pulse 80, eyes still somewhat prominent, no tremor or palpitation. Is running a millinery business.

CASE III.—S. B. H., female; 43 years. Operation October 2, 1894; right half of thyroid removed. September 1899, five years after, has been doing hard work and feels well. Nervousness almost gone. Pulse 100. Eyes still prominent but much improved.

CASE IV.—A. B., female; 21 years. Operation November 29, 1895; left half of thyroid removed. Six months later patient was perfectly well, the pulse being 74; no nervousness or insomnia (Booth).

CASE V.—N. C., female; 17 years. Operation December 17, 1895; right lobe of thyroid removed. 1902, seven years later, no nervousness, palpitation or exophthalmos, pulse 90.

CASE VI.—A T., female; 35 years. Operation January 11, 1896; left half of thyroid removed. 1898, two years after operation all nervous symptoms had disappeared, pulse was 84.

CASE VII.—R. W., female, 27 years. Operation October 13, 1897; right lobe and upper half of left lobe of thyroid removed. Immediate improvement, pulse 98, but patient has not been seen since.

CASE IX.—M. C. C., female; 18 years. Operation January 28, 1897; right half of thyroid removed. Improved, but relapsed. January 12, 1899.—Left superior thyroid artery ligated. Improved. In 1902 the improvement continued, but lately she has relapsed and now has severe symptoms (1905).

CASE X.—M. E. McK., female; 36 years. Operation November 13, 1897; left half of thyroid removed. April, 1902, was practically cured, less nervous, no tremor, eyes hardly noticeable, pulse 80 to 90, and was working hard as a bookkeeper. September, 1905, she continues well.

Of the ten patients who recovered from operation, one was improved but has not been seen since. One case was improved for two years, relapsed, later had one artery tied on the other side with improvement and again relapsed. Eight cases can be claimed as practically cured, having been followed six months (two cases), eighteen months, two years, five years, seven years, eight years, and twelve years. Two of the cases were slight, but the rest were serious and some in a dangerous condition. The four patients who died were all advanced cases. These results are encouraging, and partial thyroidectomy has apparently yielded better results than sympathectomy. But in one of my cases the latter has effected a practical cure after a relapse following thyroidectomy. On the other hand a relapse with fresh enlargement of the thyroid occurred in one case after sympathectomy, and perhaps a thyroidectomy would have brought about a cure here if we had been able to get the patient's consent. A temporary improvement was obtained in one of the relapsed cases by ligation of one artery on the other side, the improvement lasting two years or more.

This question of the proper treatment of relapsed cases is very interesting. Schulz (*Beitraege zur klinische Chirurgie* xxx. p. 638, 1901) had three cases relapse out of twenty treated by partial thyroidectomy, and operated a second time upon

the remaining portion of the gland, obtaining two cures. The other patient relapsed again and he was persuading her to submit to a third operation, as in his first operation he had merely shelled out a nodule, without actually resecting the gland. He states that in every case of relapse the remaining portions of the gland have undergone further enlargement. This continued growth of the gland also occurred in my two relapsed cases, and it seems to indicate that another partial thyroidectomy would be the proper treatment, provided that enough thyroid could be left to prevent cachexia strumipriva. If the patient upon whom I did a sympathectomy for a relapse following thyroidectomy remains as well as she is now (nearly three years after operation) we might suggest sympathectomy as an alternative when thyroidectomy was not considered wise.

The effect of the operation upon the various symptoms is interesting.

*Eyes.*—The exophthalmos is generally immediately lessened, but seldom entirely disappears. There may be a hypertrophy of the connective tissue of the orbit in long standing cases which is never entirely reabsorbed. But even when the exophthalmos continues the patients are at once relieved of the strained feeling of which they generally complain and the expression is less staring. The eyelids can be completely closed and they follow the eyeball properly in looking down.

*Thyroid Gland.*—In successful cases the remaining part of the gland is stationary or even diminishes in size. A relapse is accompanied and sometimes preceded by an enlargement of this remainder.

*Circulation.*—The pulse generally responds early, being reduced in frequency, and gaining in regularity and force as soon as the post-operative reaction has passed. In Case VI the pulse fell from 120 to 90 during the operation, becoming more rapid again, while the febrile reaction lasted, then falling permanently below 90. But in many cases the tachycardia persists, the pulse running 90 to 100 at rest and even reaching 120 on exertion, yet the patients feel so much relieved of the former tumultuous and irregular heart action that they consider themselves perfectly well and go about their regular lives without medication.

*Nervous System.*—There is an immediate improvement in the tremor, nervousness, excitability and insomnia, with a complete loss of the feeling of anxiety so common in this disease. The patient often notices this effect and speaks of it even on the day after operation, although it is not marked generally until after the postoperative reaction has subsided.

An indiscriminate collection of cases from literature would not give an accurate picture of the results obtainable by operation. But we can combine the figures of Schulz,<sup>1</sup> Koehler,<sup>2</sup> Mayo,<sup>3</sup> and Hartley<sup>4</sup> with my cases, making a total of 136 cases treated by thyroidectomy, with 17 deaths, chiefly from acute thyroidism. Four relapses are noted in this list, and several cases were lost sight of early. (Mayo gives no data to allow of proper classification of his cases) but there appear to be over one hundred cases cured, or practically cured. It has been said that the operative successes represent the periods of temporary improvement so often seen in exophthalmic goitre with or without treatment. But so many of the patients in these lists have been followed for several years and have continued well without any treatment whatever, doing their ordinary work, and sometimes very hard work, that this theoretical explanation of the results is absolutely untenable. Whatever the danger of operation may ultimately be shown to be, even if it should continue with a mortality of twelve per cent. or more, there can be no doubt that nearly all of the survivors will be cured of their symptoms, and it will probably be long before any internal treatment will be able to show such results in advanced cases of this most distressing disease.

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<sup>1</sup> Loc. cit. <sup>2</sup> *Mitth. a.d. Grenzgebiete*, 1902, ix. <sup>3</sup> Loc. cit. <sup>4</sup> *ANNALS OF SURGERY*, July, 1905, p. 33.

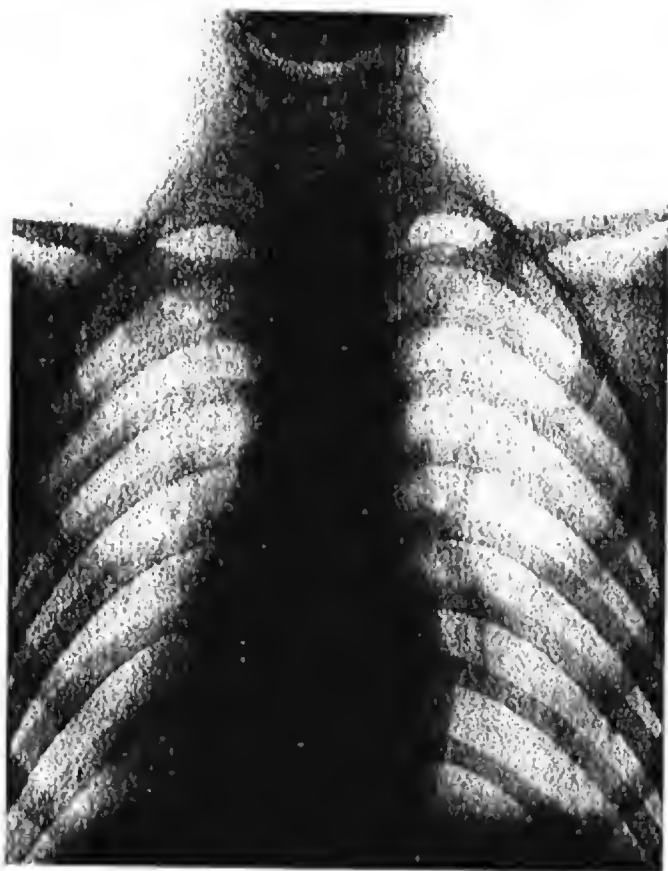


FIG. 1.



FIG. 2



FIG. 3.